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Spatial differentials in higher education access across rural and urban areas of major states of India

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Abstract

This paper examines the pattern of access to higher education across major states of India. In particular, it focuses on rural-urban differentials and disparities across various social groups. The study is based on household-level data collected by the National Sample Survey Organization (NSSO), India. The gross attendance ratio (GAR) is used to assess the extent of access to higher education. Regional and sectoral disparities are analyzed by using Sopher's index of disparity. The findings indicate significant expansion of higher education access over time. However, notable regional variations persist. Southern states show better access with rural-urban parity. Eastern states exhibit substantial sectoral variations. The study highlights significant spatial differentials across rural and urban areas within states. Targeted policy interventions are needed to ensure equitable and inclusive expansion of higher education.

1 Introduction

Higher education plays a pivotal role in promoting economic development through human capital formation. Education improves skills and productivity, thereby leading to higher earnings and overall economic efficiency (Schultz, 1961; Becker, 1964). Endogenous growth theory highlights that knowledge accumulation and human capital formation are the primary drivers of sustained economic growth in an economy in the modern world (Romer, 1990). Additional years of schooling, an important indicator of higher education, significantly increase wages (Mincer, 1974; Angrist and Krueger, 1991; Duraisamy, 2002). Education also has a positive impact on occupational mobility (Sicherman, 1990) and can break inter-generational occupational persistence (Lahiri and Nandi, 2020). The realization of the demographic dividend in developing economies like India depends crucially on the effective utilization of its large working-age population through the expansion of an inclusive knowledge economy (Bloom et al., 2003). Higher education also functions as a critical instrument for achieving inclusive growth. By expanding access and reducing disparities across gender, religion, caste, and even regions, it promotes social, occupational, and economic mobility, ensuring more equitable development outcomes. Sustainable Development Goals (4.3) also emphasize equality of access to higher education by 2030. While countries like Russia and China have already transitioned to the high- or near-universal participation stage, India remains in the massification stage.

Higher education has expanded rapidly in India over the last two decades, both in enrolment and in infrastructural facilities. The number of colleges increased from just 578 in 1950-51 to 43,796 in 2020-21, and the number of universities grew from 27 to 1,113, reflecting substantial infrastructural growth (**Table 1**). Gross enrolment ratio (GER) in higher education also increased from 1.5 in 1960-61 to 27.3 in 2020-21. Despite these increases, significant disparities in access to higher education exist between rural and urban areas and even among different social groups. Understanding these disparities is critical in advancing inclusive growth and in ensuring that higher education is an instrument of empowerment for all segments of society. Without equitable access to higher education, the economy would not be able to attain its goal of Viksit Bharat, 2047.

Table 1. Trends in the expansion of higher education institutions in India.

Year	College	University	Enrolment (million)	Gross Enrolment Ratio (%)
1950-51	578	27	0.24	-
1960-61	1,819	49	1.1	1.5
1970-71	3,277	102	2.0	4.2
1980-81	4,738	132	2.9	4.7
1990-91	5,748	185	4.9	5.9
2000-01	10,152	254	9.6	8.1
2010-11	32,974	621	27.5	19.4
2020-21	43,796	1,113	41.3	27.3

Source: Duraisamy, (2015) and AISHE Final Report | AISHE | India, (n.d.)

2 Literature review

Ilie and Rose (2016) examined the prospects for higher education in South Asia and sub-Saharan Africa in light of the goal of equal access to education in SDG 4.3. Reimer and Pollak (2010) examined the effect of higher education expansion on vertical and horizontal inequality in access in West Germany. Studies found that households' cultural environment and occupations are the most contributory factors in educational achievement in Western Europe (Marrero et al., 2024). Diversity in access to higher education in the United Kingdom was also studied by using census data (Di Miceli, 2024). Borooah and Knox (2024) focused on gender inequality in Irish higher education and found that there is little gender difference in success after enrolment.

Access and equity in higher education in India have been discussed by many authors. Eligible enrolment ratio (EER) has been used as an indicator of access (Mittal et al., 2020). Malish (2021) used GER for their study in India. Bagchi (2010) vocalized the democratization of education in India. Duraisamy (2015) noted the expansion of higher education in India. Deshpande (2006) discusses social group inequality in higher education access. Some studies (Chattopadhyay, 2009; Tilak, 2012) highlighted the growing privatization of higher education and its impact on access and equity. Gender differences in access and choice of subjects were also studied (Vaid, 2004; Chanana, 2007; Husain and Sarkar, 2011; Sahni and Shankar, 2012). Higher educational participation across regions was analyzed by Basant and Sen (2014) using three rounds of the National Sample Survey Organization (NSSO) Employment Unemployment Survey. Agrawal (2014) used the education Gini index to capture the extent of sectoral inequality in India. Regression-based decomposition techniques are also used to understand spatial inequality in higher education (Gopinath et al., 2025).

The existing literature on higher education in India identifies several research gaps that warrant further investigation. An intensive and comprehensive analysis of the extent, pattern, and direction of access to higher education across rural and urban areas of major states remains limited. Here, we explore rural-urban differentials in access to higher education at the all-India level and across major states of India. Differences across social groups are explicitly examined.

3 Data

The present study uses household-level, nationally representative data from multiple rounds of the NSSO in India on education (Schedule 25.2). Specifically, unit-level data from the 64th round (2007-08) on "Participation and Expenditure in Education", 71st round (2013-14) on "Social Consumption: Education", and 75th round (2017-18) on "Household Social Consumption: Education" of NSSO have been considered to understand the nature and extent of higher education access in India. The total sample size is 513,336 individuals in the NSS 75th round, 310,827 in the NSS 71st round, and 445,960 in the NSS 64th round. The analysis has focused on individuals aged 18-23 years, which corresponds to the conventional age group of

pursuing higher education. We have considered students currently attending graduate-level courses, including diploma and certificate programs. The study includes the 16 major constituent states of India along with the overall economy. Religion is categorized into three categories: Hindu, Muslim, and other religion (Other_Rel). The category Other_Rel includes all religions other than Hindu and Muslim. All India Survey on Higher Education (AISHE) reports are also used to focus on secondary-level data on higher education in India.

4 Methodology

We have used the gross attendance ratio (GAR) as a measure of access to higher education, defined as the number of students currently enrolled in higher education (graduation and above, including diploma and certificate courses) per hundred individuals aged 18-23. GARs based on three rounds of NSS data are compared across gender, caste, religion, and rural-urban status, both at the all-India level and for the 16 major constituent states of India. To capture the degree of access to higher education, GAR has been used, which is defined as:

$$\text{GAR} = \left(\frac{Number\ of\ students\ currently\ attending\ higher\ education}{Total\ individuals\ aged\ 18-23}\right) \times 100$$

Social and economic inequalities can be measured between two social groups or across regions, for one year or over a longer period. Researchers use various indices to measure disparity depending on the nature of the data set. Sopher's disparity index (Sopher, 1974) is generally used to measure the disparity between two groups. The formula of Sopher's Index (DI^S) is:

$$DI^S = \text{Log}\left(\frac{X^2}{X^1}\right) + Log\left(\frac{100-X^1}{100-X^2}\right)$$

where, X^2 is greater than X^1.

Sopher's disparity index failed to satisfy the additive monotonicity axiom, an essential property of all inequality measures (Kundu and Rao, 1986). The additive monotonicity axiom suggests that if a constant is added to the observations, the inequality measure must capture a decline. Kundu and Rao (1986) have proposed a modified version of Sopher's index (MDI^S), in which the constant 200 is used in place of 100, and the index is defined as:

$$MDI^S = \text{Log}\left(\frac{X^2}{X^1}\right) + Log\left(\frac{200-X^1}{200-X^2}\right)$$

where the index value will be zero in case of perfect equality. A higher index value shows higher disparity and vice versa.

We have used the above-stated MDI^S to capture rural-urban disparity in access to higher education within the states over the study period. Since the analysis is based on GAR and higher current attendance is observed in the urban sector, MDI^S can be formulated as follows:

$$MDI^S = \text{Log}\left(\frac{GAR^U}{GAR^R}\right) + Log\left(\frac{200-GAR^R}{200-GAR^U}\right) \text{ where } GAR^U > GAR^R$$

where, U stands for urban and R stands for rural.

A positive value of the disparity index indicates disparity favoring the urban sector and a negative value indicates the reverse.

To examine inter-state disparity in access to higher education, we have used the State disparity index (STDI) based on the coefficient of variation (CV), defined as:

$$\text{STDI} = \frac{\sqrt{\frac{1}{n-1}\sum_{1}^{n}(GAR_i - \overline{GAR})^2}}{\frac{1}{n}\sum_{i=1}^{n} GAR_i} \times 100$$

where *n* is the number of states included in the analysis.

5. Results

5.1 GAR across social groups

Data shows that the degree of access to higher education has increased at the all-India level across different social groups during 2007-08 to 2017-18 (**Table 2**). GAR has increased from 12.67 in 2007-08 to 24.30 in 2017-18, indicating expansion in higher education. A significant rural-urban divide is visible in the data. While urban GAR has reached 36.25 in 2017-18, rural GAR remained low at 19.21. Disparities in access to higher education persist amongst different social groups. GAR for 2017-18 shows that scheduled tribes (15.00) and scheduled castes (19.12) are lagging other backward classes (24.21) and others (32.32). Despite continued growth in higher education attendance, differences are noted across gender, region, caste and religion in terms of access.

Figure 1 depicts the degree of access to higher education as indicated by GAR across major Indian states during 2007-08 to 2017-18. Most states show a growing pattern; however, substantial regional disparities are observed. Kerala, Tamil Nadu and Maharashtra consistently show higher level of access, as reflected in their higher GAR values. The GAR for Kerala has increased from 23.75 in 2007-08 to 40.06 in 2017-18. Rajasthan also exhibits continued growth in GAR, i.e., from 10.08 in 2007-08 to 24.95 in 2013-14, and finally reached 30.51 in 2017-18. Eastern states like Bihar, Odisha, and Assam have lower GAR in higher education for all the time points and exhibit relatively low levels of access despite some progress.

5.2 GAR across rural and urban areas

At the all-India level, rural GAR has increased from 8.31 in 2007-08 to 19.21 in 2017-18, while urban GAR has risen from 23.12 to 36.25, maintaining a substantial divide (**Table 3**). Across the states, urban areas consistently report much higher access than rural counterparts. Kerala

Table 2. Gross attendance ratio (GAR) in higher education in India across social groups (gender, region, caste, and religion).

Social groups	Parameters	2007-08	2013-14	2017-18
Gender	Male	11.25	25.48	26.49
	Female	13.99	22.46	21.87
Region	Rural	8.31	19.10	19.21
	Urban	23.12	35.07	36.25
Caste	Schedule Tribe (ST)	5.41	13.42	15.00
	Schedule Caste (SC)	8.51	17.69	19.12
	Other Backward Class (OBC)	10.92	23.45	24.21
	Others	19.84	33.47	32.32
Religion	Hindu	13.46	25.55	25.73
	Islam	6.96	13.61	15.30
	Other religion	16.16	31.73	29.64
Overall		12.67	24.04	24.30

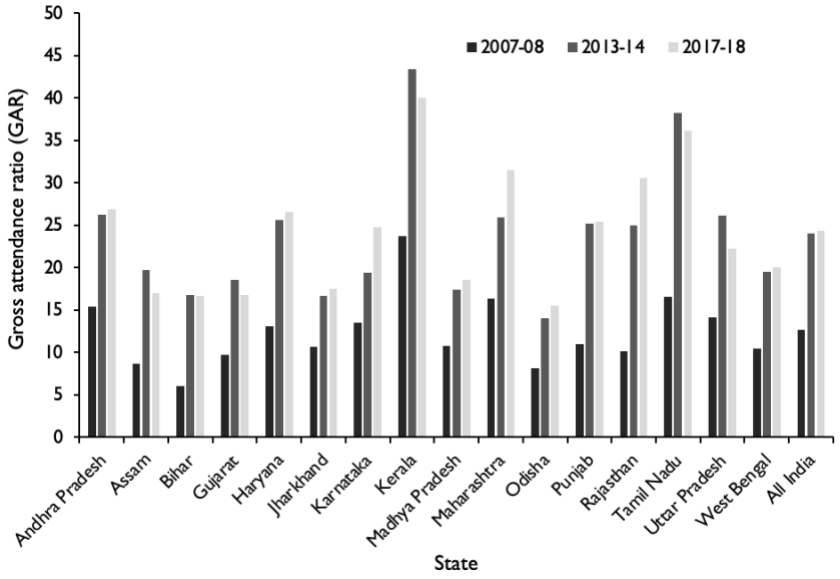

Fig. 1. Access to higher education across major Indian states according to gross attendance ratio (GAR) estimates.

stands out with a relatively balanced situation between rural and urban regions. In contrast, Bihar, Madhya Pradesh, and Odisha have continued to exhibit low rural access. The data indicate that, despite increased access to higher education, rural-urban disparities remain a major challenge for the states.

To better understand these patterns, the nature of rural-urban differences in access to higher education across major Indian states has been examined by using MDI[s]. The MDI[s] value has declined from 0.480 in 2007-08 to 0.319 in 2017-18 at the all-India level, which shows improvement in access in rural parts of India (**Fig. 2**). Kerala, with a near-zero value of 0.004

Table 3. Rural-urban differences in access to higher education across major Indian states according to gross attendance ratio (GAR) estimates.

States	2007-08		2013-14		2017-18	
	Rural	Urban	Rural	Urban	Rural	Urban
Andhra Pradesh	9.77	27.70	17.71	43.10	19.70	42.28
Assam	6.94	23.26	16.44	37.12	14.38	41.15
Bihar	3.63	23.62	14.02	36.19	14.37	35.97
Gujarat	5.40	16.09	12.82	27.63	10.97	26.06
Haryana	9.52	22.70	19.22	42.29	20.64	40.20
Jharkhand	6.19	27.99	13.69	26.29	13.00	33.06
Karnataka	11.91	16.47	15.92	24.34	18.04	36.26
Kerala	21.88	29.19	40.41	47.26	39.91	40.24
Madhya Pradesh	4.32	27.01	11.00	33.28	12.73	34.77
Maharashtra	9.47	25.14	18.84	35.08	27.35	36.81
Odisha	5.13	24.41	10.24	29.46	12.76	29.65
Punjab	8.57	15.44	22.75	29.07	21.87	31.13
Rajasthan	6.39	21.65	21.33	34.19	25.56	44.01
Tamil Nadu	10.25	24.92	33.55	42.46	33.02	39.18
Uttar Pradesh	10.81	24.01	23.46	34.63	19.45	32.48
West Bengal	6.33	24.51	13.70	33.39	14.00	35.83
All India	8.31	23.12	19.10	35.07	19.21	36.25

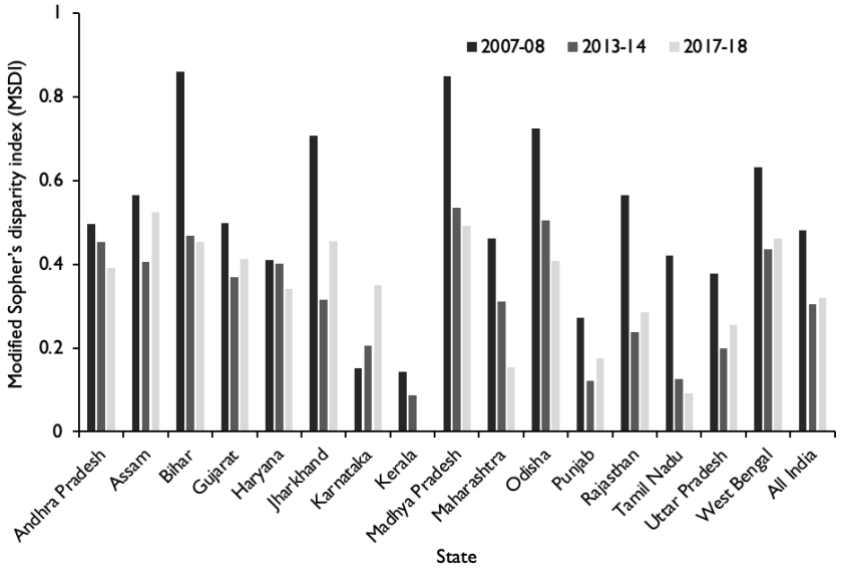

Fig. 2. Rural-urban disparity in access to higher education based on the modified Sopher's disparity index (MSDI).

in 2017-18, indicates almost complete rural-urban parity. Tamil Nadu and Maharashtra also demonstrate consistent improvement. Madhya Pradesh (0.491), Bihar (0.452), Assam (0.524), and West Bengal (0.462) still have high sectoral disparity in access to higher education as in 2017-18. Southern and some western states are improving access and are reducing the rural-urban divide.

The extent of the rural-urban divide and its changes over time across major Indian states are clearly observed. A wide disparity is observed in most states, except in some southern states. To examine the inter-state variations in GAR in higher education, the STDI has been calculated. The STDI value for the rural sector has declined from 50.77 in 2007-08 to 42.54 in 2013-14 and finally to 40.98 in 2017-18. In the urban sector, STDI declined from 17.89 in 2007-08 to 13.56 in 2017-18 (**Fig. 3**). These trends highlight the persistent challenge of bridging rural-urban disparities and highlight the need for targeted policy interventions.

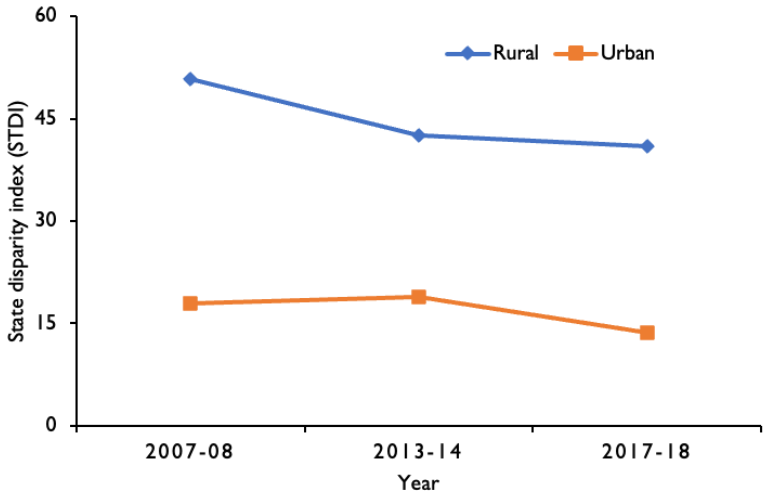

Fig. 3. Inter-state variations in access to higher education based on the state disparity index (STDI).

6 Discussion

Socio-economic changes, economic growth, educational awareness, and infrastructural expansion may be driving the expansion of higher education. Understanding rural-urban differences is crucial to understanding the higher education landscape in India (Agrawal, 2014; Gopinath et al., 2025). Results show substantial differences between rural and urban areas that have persisted over the years. However, the gaps are narrowing, with GAR for rural and urban areas at 19.21 and 36.25, respectively, in 2017-18. The MDI^S value captures the extent of rural-urban disparity within the state. Some states, such as Kerala, show almost parity, while eastern states (Bihar, Assam and West Bengal) still experience high disparity between rural and urban areas. Spatial differences generally lead to regional imbalances in a country, which is not feasible from the perspective of balanced and inclusive development. India exhibits regional disparity in almost every aspect of development. Inter-state variation in access to higher education as captured by the values of STDI for both rural and urban sectors and compared over time. Data show that spatial disparity has declined in both the rural and the urban areas of the states. Even the gap between rural and urban areas within the sector is reducing over time, though this is a good sign for the economy; however, the level of spatial differentials is highly pronounced and alarming. The degree of disparity between rural and urban areas within the state is also highly pronounced in some states.

7 Conclusion

Access to higher education in India has been expanded over the study period with significant spatial variations. Southern states (Tamil Nadu and Kerala) consistently report higher attendance levels while eastern states (Bihar, Jharkhand, and Odisha) exhibit relatively low attendance. Despite overall improvement, rural-urban disparities remain a persistent concern, though the gap has shown signs of gradual reduction. The MDI^s value highlights differences in rural-urban higher education access. Kerala shows near rural-urban parity, whereas Madhya Pradesh, Bihar, and West Bengal continue to exhibit high levels of rural-urban disparity. India needs targeted, region-specific policy interventions to reduce disparities in access to higher education across regions, social groups, and even rural and urban areas. Improving rural access and expanding higher educational institutions are crucial to achieve equitable access. The government should take appropriate initiatives to adopt successful models from better-performing states, thereby fostering more equitable and inclusive participation in higher education across regions in India.

8 Ethical statements

Not applicable.

9 Conflict of interest

The author declares no conflict of interest related to this study.

10 Data availability statement

We have used the National Sample Survey data of India (NSS 64, NSS 71 and NSS 75) on education (Schedule 25.2).

11 Author contributions

T.K. Samanta: Formal analysis, investigation, methodology, and writing – original draft. J. Sen: Conceptualization, supervision, and writing – review & editing. The authors approved the manuscript for publication.

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